

## WE CLAIM:

1. A retractile trailer hitch comprising:

a tube shaft extending along an axis and fixed on a motor-vehicle frame;

an arm having a tubular inner end pivotal on the tube shaft and an outer ball end, the arm being pivotal on the tube shaft about the axis between two angularly offset arm end positions, the arm inner end being limitedly axially displaceable on the tube shaft between a locked position and an unlocked position;

interengageable formations on the frame and on the arm inner end for angularly arresting the arm in the arm end positions in the locked position of the arm inner end, the formations being unengageable with each other in the unlocked position of the arm inner end, whereby the arm can pivot freely between its arm end positions in the unlocked position but is angularly nonmovable on the shaft in the locked position;

a lock element axially displaceable inside the tube shaft between a holding position and a freeing position;

means including balls inside the arm inner end coupled to the lock element for axially displacing the arm into the locked position on displacement of the lock element into the holding position and for displacing the arm axially into the

23     unlocked position on displacement of the lock element into the  
24     freeing position; and  
25             an actuator connected to the lock element for axially  
26     displacing the lock element between its holding and freeing  
27     positions.

1             2.   The retractile motor-vehicle trailer hitch defined  
2     in claim 1, further comprising  
3             a spring braced between the tube shaft and the lock  
4     element for urging the lock element into the holding position.

1             3.   The retractile motor-vehicle trailer hitch defined  
2     in claim 2 wherein the actuator includes a remote operator and a  
3     flexible connection between the remote operator and the lock  
4     element.

1             4.   The retractile motor-vehicle trailer hitch defined  
2     in claim 1 wherein the means includes radially inwardly open  
3     seats on the arm inner end in which the balls are receivable and  
4     having angled cam edges engageable with the balls to axially  
5     displace the arm inner end.

1           5. The retractile motor-vehicle trailer hitch defined  
2     in claim 4 wherein the lock element has a tapered outer surface  
3     engageable with the balls.

1           6. The retractile motor-vehicle trailer hitch defined  
2     in claim 1, further comprising  
3           a retaining element displaceable between a position  
4     blocking axial movement of the lock element and a position  
5     permitting axial movement of the lock element; and  
6           cam formations on the arm end operatively engageable  
7     with the retaining element to displace the retaining element into  
8     the position permitting axial movement of the lock element only  
9     in the arm end positions.

1           7. The retractile motor-vehicle trailer hitch defined  
2     in claim 6, further comprising  
3           means for preventing the lock element from rotating  
4     about the axis in the tube shaft.

1           8. The retractile motor-vehicle trailer hitch defined  
2 in claim 6 wherein the lock element is formed with a radially  
3 extending passage, the arm inner end is formed with a radially  
4 extending passage aligned in the arm end positions with the lock-  
5 element passage, and the retaining element is a retaining ball  
6 radially displaceable in the passages.

1           9. The retractile motor-vehicle trailer hitch defined  
2 in claim 8 wherein the retaining element includes a pusher rod  
3 radially displaceable in the passage of the arm inner end and  
4 engageable with the retaining ball and with the cams.

1           10. The retractile motor-vehicle trailer hitch defined  
2 in claim 1 wherein the formations include balls on the frame and  
3 axially open seats on the arm end in which the balls engage in  
4 the locked position.

1           11. The retractile motor-vehicle trailer hitch defined  
2 in claim 1 wherein there are first and second sets of the balls  
3 in axially offset respective first and second planes, the lock  
4 element having axially offset first and second cam formations  
5 spaced apart by a distance greater than an axial distance between  
6 the planes and engageable with the respective sets of balls.

1           12. The retractile motor-vehicle trailer hitch defined  
2 in claim 11 wherein the lock element has a region of reduced  
3 diameter between the first and second cam formations.

1           13. The retractile motor-vehicle trailer hitch defined  
2 in claim 11 wherein the arm inner end is formed with first and  
3 second inwardly open grooves in which the respective sets of  
4 balls are engageable in the locked and unlocked positions, the  
5 first and second grooves being offset axially from each other by  
6 a distance shorter than the axial distance between the planes.

1           14. The retractile motor-vehicle trailer hitch defined  
2 in claim 1, wherein the formations include  
3 a pin set in the vehicle frame and having a head  
4 projecting axially toward the arm inner end, and  
5 a pair of angularly offset seats in the arm inner end  
6 open axially toward the frame, the pin head being receivable in  
7 the seats in the arm end positions.

1           15. The retractile motor-vehicle trailer hitch defined  
2 in claim 14 wherein the pin head is generally semispherical.

1           16. The retractile motor-vehicle trailer hitch defined  
2 in claim 14 wherein the arm inner end is formed between the seats  
3 with a track on which the head rides when the arm inner end is  
4 between the arm inner positions and which holds the arm inner end  
5 in the unlocked position.

1           17. The retractile motor-vehicle trailer hitch defined  
2 in claim 1 wherein the frame has a pair of parts to one of which  
3 the tube shaft is bolted, the hitch further comprising

4           a spacer between the other of the parts and the tube  
5 shaft; and

6           a bolt extending through the other of the parts and  
7 through the spacer and threaded into an outer end of the tube  
8 shaft.

1           18. The retractile motor-vehicle trailer hitch defined  
2 in claim 1 wherein the tube shaft and arm inner end are formed  
3 with confronting angled cam surfaces, the means including a  
4 pusher ball engaging both of the surfaces and engageable with the  
5 lock element such that on axial displacement of the lock element  
6 the pusher ball forces the cam surfaces apart and moves the arm  
7 inner end into the unlocked position.

1           19. The retractile motor-vehicle trailer hitch defined  
2    in claim 18 wherein the cam surface of the tube shaft is formed  
3    by an inwardly open groove holding the pusher ball, the cam  
4    surface of the arm inner end being frustoconical and centered on  
5    the axis.

1           20. The retractile motor-vehicle trailer hitch defined  
2    in claim 1 wherein the lock element is an axially displaceable  
3    bolt.